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09/558,819	04/26/2000	Toshihiko Koseki	JA9-1998-0203US1	1693

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EXAMINER

PARKER, KENNETH

ART UNIT PAPER NUMBER

2871

DATE MAILED: 01/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Applicati n No.

09/558,819

Applicant(s)

KOSEKI ET AL.

Examiner

Kenneth A Parker

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 13 November 2000.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-8 and 10-20 is/are rejected.
- 7) ☒ Claim(s) 3 and 9 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

**Claims 13-27 and 29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

**With respect to claims 13-19, 29,** the expression "ratio of the diameter of the upper bottom to that of the diameter" has no discernable meaning.

**With respect to claims 20-27, 29,** sentence "said spacers have length of one side of the upper bottom, which is equal to one side of the lower bottom and a horizontal surface in the position decreased by certain ratio from the maximum height of said spacers or the diameter of the upper bottom, which is equal to that of the lower bottom" has no discernable meaning.

### ***Claim Rejections - 35 USC § 103***

2. **Claims 1-2, 4-8, 10-14, 16-22, 24-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shioda et al, U.S. Patent #6,299,949 in view of Kajita et al, U.S. Patent #6,275,280.**

Please note, in accordance with MPEP 2112, WHEN THE STRUCTURE RECITED IN THE REFERENCE IS SUBSTANTIALLY IDENTICAL TO THAT OF THE CLAIMS, CLAIMED PROPERTIES OR FUNCTIONS ARE PRESUMED TO BE INHERENT. As the liquid crystal cell structure is shown, even if the properties were considered definite and not disclosed by Shioda, it is incumbent upon applicant to show an unobvious difference with respect to the claimed

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properties.

**With respect to claims 1 –2 and 4**, Shioda et al disclose "a liquid crystal display device which comprises two substrate, a liquid crystal sandwiched and supported between the two substrate, and spacers, for maintaining a predetermined substrate substrate spacing, provided on at least one of the substrates in its portion where the liquid crystal sandwiched and supported, the spacers being formed of photocured resin layer the photocured resin layer having a Young's modulus, derived from a stress-strain curve, of not more than 10,000 MPa at 25 d. C. (=1, 000 kgflmm<sup>2</sup> - VL) and not less than 10 Mpa at 150 d. C. (= 1 kgflmm<sup>2</sup> -VL)" They also disclose, as another aspect of their invention, the spacers being formed of a photocured resin layer, wherein the photocured resin layer has a dynamic hardness value of 30 to 60 under load." See col.3, lines 14 -28.

Lacking from the disclosure of Shioda et al is the exact range of value of DH and any value of HV. However, as the value of K can be arbitrary selected, this limitation is inherently met by any reference. Further, if the DH has the same units as those of Shioda et al. the limitation would be obvious over Shioda et al. They do not disclose the identical range of applicant with respect to the variable DH, however they disclose a range which either overlaps at the end point, or substantially close. As it has been judicially determined that overlapping ranges are at least obvious, the range of Shioda et al would have been obvious over the claimed range.

As to HV, Shioda et al disclose that the degree of plastic deformation is related to and described by DH. (See col.15, 1-25). In other words, the range of DH as defined by Shioda et al also defines a certain range of HV even though they do not disclose specific values. Moreover, since the range of DH, disclosed by Shioda et al is close or overlaps with those of the applicant, the same is true for VH (see the previous paragraph). On the other hand, as the value of K can be arbitrary selected, this limitation is inherently met by any reference. Also, it was well known in the art that the dynamic hardness should fall within a certain hardness value range "from the viewpoint of avoiding dynamic instability". See col.13, lines 1-14; col.23, lines 1-7. Since plastic deformation is defined by dynamic hardness (see col.15, lines 1-16) it also should fall within a certain range to avoid the dynamic instability.

They also disclose: "the storage modulus as determined as dynamic viscoelasticity measurement (=elastically deformable component, that is a component of which the shape can be returned to the original shape) should be not more than specified value in the above temperature range, provided that the storage modulus should be not than the certain value from the viewpoint of avoiding dynamic instability. Further the loss tangent (=proportion of the deformation; the larger this proportion, the larger the amount of the plastically deformable component) should not be more than the specified value. Further, the Young's modulus derived from a stress-strain curve should be not more than the specified value at 25 d. C., provided that the Young's modulus should be not less than a certain value from the viewpoint of avoiding dynamic instability. Further, the dynamic

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hardness should fall within a certain hardness value range." See col.13, lines 1-33, col.2, line 55 -col.3, line 28.

**With respect to claim 5, Shioda et al disclose:** "After preparation of liquid crystal cells, a reliability test is carried out. When the coefficient of thermal expansion of the resin constituting the spacer is larger than that liquid crystal, the cell cannot cope with the thermal expansion the liquid crystal. In this case the pressure within the cells becomes lower than the atmospheric pressure, and air enters through the sealed portion, often leading to a foaming phenomenon. Therefore, the properties required of the spacer are those of liquid crystal devices in the temperature range of -40 d.C. to 80 d.C., that is in such a temperature range that reliability is generally required of the liquid crystal devices.

**With respect to claims 6-8 and 10-11, Shioda et al teaches:** "The spacer may be disposed in a proper density, such as a density of one spacer per four pixel or one spacer per one pixel. The spacer density in terms of volume density is generally 0.1 to 5%, preferably 0.3 to 2%, from the viewpoint of the function of the spacer. When the volume density of the spacer exceeds the upper limit of the above density range, the pouring efficiency in the step of pouring the liquid crystal is unfavorably lowered. On the other hand, a smaller volume density than the lower limit of the above volume density range is causative of the deformation of the spacer at the time of cell assembling. The surface area density of the spacer is generally 50 to 2,000 m<sup>2</sup> /mm<sup>2</sup>, preferably 500 to 1,000 m<sup>2</sup> /mm<sup>2</sup>. A surface area density smaller than the lower limit of the above surface

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area density range is causative of the deformation of the spacer at the time of cell assembling, while when the surface area density exceeds the above surface area density range, the pouring efficiency in the step of pouring the liquid crystal is unfavorably lowered. See col.16, lines 25-42.

When one spacer is provided for each size of 100 mx 300 m in color pixel, about 33 spacers can be formed in 1 mm. This value is smaller than 100 spacers/mm, the number of spacers per mm in the case of the conventional technique." See col.16, lines 50-54.

Lacking from the disclosure is exact range of value of the spacer density. Shioda et al do not disclose the identical range of the applicant with respect to the spacer density, however, they disclose a range which either overlaps or substantially close. As it has been judicially determined that overlapping ranges are at least obvious, the range of Shioda et al would have been obvious over claimed range.

**With respect to claim 12-14, 16-22, 24-27,** Shioda et al disclose that "the shape of the spacer formed by development may be, for example, a trapezoid having a height 2 to 10 m, and the edge of the spacer may be a round spherical form or an angular rectangular form." See col.16, lines 43-49.

Lacking from the disclosure of Shioda et al is detailed discussion of the any exact shape

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of spacers. However it is well known in the art that the sizes, position and number of spacers are determined in accordance with the rigidity of the liquid crystal panel and, thus, is a design choice.

**With respect to claims 28, 29 Shioda** et al also teach "a process for producing this liquid crystal display device, comprising the steps of: providing substrates between which a liquid crystal display device is to be sandwiched and supported; coating a photosensitive resin composition onto at least one of the substrate in its portions, where the liquid crystal is to be sandwiched and supported, to a thickness of spacers; providing a photomask on the coating, exposing the coating; and developing the exposed coating to form a photocured resin layers as spacers, the photocured resin layer having a dynamic hardness of 30 to 60 under load." See col.4, line 62 - col.5, line23.

By claiming a dynamic hardness of 30 to 60, Shioda et al fail to include a range of dynamic hardness of 26 to 30 and "hardness of plastic deformation" from 38 to 46. However, it was well known in the art that the dynamic hardness should fall within a certain hardness value range "from the viewpoint of avoiding dynamic instability". See col.13, lines 1-14; col.23, lines 1-7. Since plastic deformation is defined by dynamic hardness (see col.15, lines 1-16) it also should fall within a certain range to avoid the dynamic instability.



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Therefore, it would have been obvious to a person of an ordinary skill in the art at the time when the invention was made to choose a particular range of dynamic hardness value, as well as a corresponding range of plastic deformation value to avoid the dynamic instability.

Shioda et al fail to specifically teach spacers in non-display region. However, the importance of presence of spacers and their properties and characteristics, as well as their distribution density in this area is well known in the art. For example, Kajita et al teach extensively on spacers in non-display area, in particular, on their elastic properties and their distribution. See col.3, line 20 -col.6, line 60; col.9, line 40- col.11, line 20.

Therefore, it would have been obvious to a person of an ordinary skill in the art at the time when the invention was made to introduce spacers of specific mechanical properties and with specific density in non-display area in order for liquid crystal display substrates to withstand a compression force.

***Allowable Subject Matter***

**Claims 3, 9,15, and 23 would be allowable if rewritten to overcome rejection(s) under 35 U.S.C. 112, second paragraph set forth in this Office action (if present), and to include all of the limitations of the base claim and any intervening claims.**

The following is an examiner's statement of reasons for allowance: With several variables narrowly claimed, it would not be reasonable to assert that the values are selection of a result effective variable. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Response to Arguments***

Applicant's arguments filed have been fully considered but they are not persuasive.

With regard to the value of  $k$ , it is still a concern that the value is variable so that the value of the equation is not set, that it is dependent upon the equipment testing, so determination of whether a reference such as the device of Shioda may actually be the same would be determined by the selection of the equipment used, making the value indefinite. Since the examiner cannot tell if the value is test equipment independent or not, the examiner has dropped the rejection. However, if the value is determined by the equipment used, the language would indeed be indefinite.

Applicants amendment regarding the upper bottom and lower bottom ratio unfortunately did not help, as the ratio portion was not the problem but the terms upper bottom and lower bottom. As discussed in the previous office action, the language

“upper bottom” and “lower bottom” are genuinely not understood. Applicant is invited to contact the examiner to discuss these issues and attempt to reach an understanding of the language and technology employed in this application.

Regarding characteristics of the spacers, the closeness of overlapping ranges, issues of design choice render the claims not allowable. Additionally applicant has not met the burden of showing a non-obvious difference (needed where prior art disclosed devices of the same structure but silent on a characteristic). As many of the references discuss the optimization of the same or related parameters for preventing bubbling, assertions that the selection of these characteristic gives the benefit of preventing bubbling is insufficient to show non-obviousness. Additionally, applicant needs to show novelty, something applicant has not yet argued.

Regarding applicant's argument involving the density ratio, please keep in mind that selection of a well known matter of design choice has been judicially determined to have been obvious. Here, as no new or unexpected result can be construed as occurring. This is because with different substrate thickness and sizes, the values would be different. For example, a tested ratio that gives good results with a 1 inch display having a thick substrate would be expected by those of ordinary skill to be very different from that for a 50 inch display with a thin substrate such as a 1.1mm. Also the appropriate ratios would be determined by what type of liquid crystal used, for example, the ratio appropriate for ferroelectric would be very different than the ratio appropriate for nematic or a polymer network. Therefore the ratio by itself must be a design choice. Please also note, that the reference Shioda and Kajita et al do discuss the ratio of

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spacers describing the tradeoffs in the selection (described in the office action above), as do many of the other prior art references of record.

Applicant discusses the circular diameter and or lengths of the spacers as being in claims 12-19, a feature which the examiner does not see in the claims, only "top and bottom" bottoms, language discussed as being not understood, and yet not clarified by applicant.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Many additional reference have been cited which teach various features of the claimed inventions and could be used to apply rejections. In particular, Miyazaki et al, Morimoto et al, Shigeta et al, and Saito et al all discuss selection of the spacer density and material characteristics being selected to minimize bubbles (sometimes described as foaming).

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

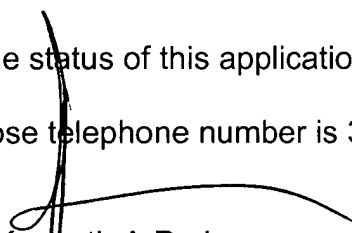
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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kenneth A Parker whose telephone number is 703-305-6202. The examiner can normally be reached on 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on 305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 308-0956.



Kenneth A Parker  
Primary Examiner  
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January 26, 2003